UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 14 2016

OFFICE OF WATER

Miyoko Sakashita, Esq.
Senior Attorney, Oceans Director
Center for Biological Diversity
351 California Street, Suite 600
San Francisco, California 94104

Dear Ms. Sakashita:

By this letter, EPA provides its full response declining to take the actions requested in the April 17, 2013 Center for Biological Diversity (CBD) letter that the Agency "initiate a rulemaking and promulgate water quality criteria"[1] for both aragonite saturation state and calcification rate to measure ocean acidification. The CBD letter also requested that EPA publish additional information to provide guidance on ocean acidification pursuant to Clean Water Act (CWA) section 304(a), including: the factors necessary to prevent deleterious changes in seawater chemistry due to anthropogenic carbon dioxide (CO_2) emissions; the factors necessary to prevent adverse impacts of ocean acidification on fish, shellfish and wildlife; recommended methods for measuring ocean acidification parameters and considering data and information on ocean acidification; and recommendations for developing and implementing Total Maximum Daily Loads (TMDLs) for ocean acidification.

EPA initially responded to this petition, in part, on May 17, 2013. At that time, EPA explained its intention to convene a technical workgroup to evaluate data and research regarding water quality parameters most relevant for understanding and addressing ocean acidification and its causes. Soon after, EPA learned that a similar group, The West Coast Ocean Acidification and Hypoxia Science Panel (OAH Panel), convened with the same purpose, so EPA did not convene a separate group, but awaited the OAH Panel's final report. EPA has now reviewed the OAH Panel's final report, *Major Findings, Recommendations, and Actions* published in April 2016.[2]

In this report, the OAH Panel recognizes that the dominant cause of ocean acidification is global atmospheric CO_2 emissions that require global solutions. EPA is currently using its authority under the Clean Air Act to address greenhouse gas emissions from a variety of sources. The OAH Panel also

[1] Though the petition requests that EPA "initiate a rulemaking and promulgate water quality criteria," EPA notes that CWA section 304(a) does not direct EPA to promulgate criteria or information as regulations. EPA issues CWA section 304(a) criteria as recommendations to states, rather than rules that have a binding effect. 40 C.F.R. 131.3(c). EPA regulations provide that states must adopt criteria that are protective of designated uses and based on sound scientific rationale. 40 C.F.R. 131.11(a)(1). EPA regulations further provide that, in establishing criteria, states should establish numerical values based on EPA's CWA section 304(a) recommendations, or as modified to reflect site-specific conditions or other scientifically defensible methods, and that states should establish narrative criteria or criteria based on biological monitoring methods where numerical criteria cannot be established or to supplement the numeric criteria. 40 C.F.R. 131.11(b).

[2] http://westcoastoah.org/wp-content/uploads/2016/04/OAH-Panel-Key-Findings-Recommendations-and-Actions-4.4.16-FINAL.pdf.

found that while local actions will not address global sources and impacts, it would be beneficial to reduce local land-based sources of nutrients and organic matter pollution that flow to near-shore coastal and estuarine waters that can exacerbate acidification. EPA views the tools provided by the CWA as better suited to address these local land-based sources of pollution.

Although EPA is actively engaged in efforts to better understand and address ocean acidification as set forth below, the Agency declines at this time to take the actions that CBD requests under the CWA to develop new nationally recommended water quality criteria and guidance specific to ocean acidification. As the OAH Panel recognized, additional study would be needed to derive national recommendations for water quality parameters relevant to ocean acidification. EPA has limited resources to address a broad range of water quality concerns across the nation, and the Agency has decided to prioritize other efforts under the CWA that the Agency views as having greater utility in addressing ocean acidification. Specifically, while the OAH Panel supported further study to identify both the biologically relevant indicators and the thresholds necessary to protect aquatic life from ocean acidification, EPA has decided not to prioritize this research for the purposes of developing new national 304(a) criteria recommendations or guidance at this time. Instead, EPA is allocating the finite resources available to assist states and territories in better understanding and mitigating the impacts of acidification in near-shore coastal and estuarine waters that may be exacerbated by certain land-based sources of pollution (a process commonly referred to as coastal acidification) using currently available tools of the CWA.

Specifically, EPA is:

1. Continuing to implement existing CWA section 303(d) program guidance related to coastal acidification.

   EPA continues to implement the 2010 memorandum, *Integrated Reporting and Listing Decisions Related to Ocean Acidification*.[3] In that document, EPA noted that states have the responsibility to list waters not meeting water quality standards and to solicit existing and readily available information using the current 303(d) listing framework. Consistent with the 2010 memo, EPA continues to review state 303(d) lists for consideration of data and information regarding parameters related to coastal acidification in the context of applicable state water quality standards. This includes working with states to ensure consideration of data and information submitted by CBD and others in response to state solicitation for their 303(d) lists. As described further in this letter, EPA continues to support and track progress in research on coastal acidification impacts, development of sampling protocols, biological assessment tools, and other efforts by EPA and the scientific community more broadly. EPA will take those efforts into consideration in evaluating additional guidance that would be helpful to states in making impairment decisions, and developing TMDLs and other water quality management plans.

2. Working to enhance monitoring networks to better understand and communicate the occurrence of coastal acidification to the public.

[3] Memorandum from Denise Keehner to Water Division Directors, Regions 1-10. November 15, 2010. *Integrated Reporting and Listing Decisions Related to Ocean Acidification.*

Monitoring is fundamental to understanding the potential ecological and socioeconomic impacts of coastal acidification. EPA is currently expanding its monitoring capacity through collaborations with the National Estuary Programs (NEP). For instance, EPA is sponsoring the deployment of state of the art autonomous monitoring systems in San Francisco Bay (CA), Santa Monica Bay (CA), Tampa Bay (FL), Massachusetts Bay (MA), Casco Bay (ME), Barnegat Bay (NJ), Long Island Sound (NY), Tillamook (OR), and Coastal Bend Bays (TX). These monitoring systems can perform high-frequency and high-precision measurements of pH and dissolved CO_2 in coastal waters, which allow characterization of the carbonate system. The establishment of long-term time series data will provide information on the intensity and duration of acidification events, as well as natural variability (e.g., diurnal or seasonal change) in highly dynamic estuarine environments.

Further, EPA is assessing the development of sampling protocols that will enable the collection of acidification-related parameters in future surveys for the National Coastal Condition Assessment, which is a national statistical survey that collects samples for coastal water quality parameters once every five years.

3. Continuing to conduct research to better understand the role of nutrient pollution in coastal acidification and continuing to advocate that states do more to address nutrient pollution.

EPA continues to stress the importance of reducing nitrogen and phosphorus pollution into our nation's waters for a host of reasons, including that nutrient pollution has been linked to increased hypoxia and decreased pH levels in near-shore coastal waters. EPA continues to work with states to reduce nutrient pollution and continues to advocate that states develop numeric nutrient criteria, which can serve as effective tools to reduce the impact of eutrophication, as well as coastal acidification. To this end, EPA recently released a renewed call to action to the states to reduce nutrient pollution.[4] This memorandum highlights the continued need for action to address nutrient pollution nationwide, and calls upon states and stakeholders to intensify their efforts in collaboration with EPA by developing and implementing nutrient frameworks and strategies to prioritize watersheds, setting load-reduction goals, reducing point and non-point sources, providing for accountability and public reporting, and continuing to develop numeric nutrient criteria to clearly identify nutrient levels that are protective of the designated uses and serve as clear goals for protecting and restoring those uses.

To better understand the role of nutrient pollution in coastal acidification, EPA has several ongoing research projects. As part of the enhanced monitoring efforts in the NEP study areas for pH and dissolved CO_2, as mentioned above, the work is being coupled with studies of nutrient concentrations to better understand how land-based inputs of nutrient pollution can potentially exacerbate acidification. Additionally, EPA is pairing carbonate measurement with nutrient concentration sampling in Delaware Bay and Narragansett Bay to identify correlations between these water quality parameters. Similarly, EPA is conducting surveys in the Snohomish River Delta (WA) and Tillamook Estuary (OR) to evaluate the natural

[4] Memorandum from Joel Beauvais to State Environmental Commissioners and State Water Directors. September 22, 2016. *Renewed Call to Action to Reduce Nutrient Pollution and Support for Incremental Actions to Protect Water Quality and Public Health.*

variability in carbonate chemistry dynamics and quantify the role of anthropogenic nutrient pollution inputs on coastal acidification. This research may prove helpful to states when deriving numeric nutrient criteria to protect their near-shore coastal and estuarine waters.

4. Working to reduce land-based runoff of non-point source pollution.

   The reduction of nutrients, organic matter and other pollutants introduced to coastal waters by non-point sources are among the many benefits and ecosystem services provided by green infrastructure and storm water programs, which should help mitigate coastal acidification. EPA is implementing ongoing programs for green infrastructure,[5] and the control of storm water discharges,[6] which have significant bearing on the loading of these pollutants into coastal and estuarine waters. EPA supports community efforts to incorporate green infrastructure into programs and policies, and provides technical assistance and information for communities to use in implementing green storm water infrastructure in a smart-growth context. EPA recently released a draft guide, *Community Solutions for Stormwater Management: A Guide for Voluntary Long-Term Planning*[7], to assist states and local governments in developing and implementing effective long-term stormwater plans. This guide will be accompanied by a web-based toolkit to help walk communities through the planning process and technical assistance in five communities to develop long-term stormwater plans to serve as national models.

   Additionally, EPA is working with the Federal Emergency Management Agency and the U.S. Army Corps of Engineers to encourage stakeholder implementation of nature-based storm water and flood risk management practices to help protect water quality and habitat, sequester carbon, reduce gray infrastructure demand and adapt to climate change. This effort includes funding for pilot projects in communities to integrate these practices into local hazard mitigation plans. In addition, EPA is preparing outreach materials and economic benefit assessments to encourage the adoption of green storm water infrastructure.

5. Continuing to publish technical support guidance for states to use when developing biological criteria and supporting pilot studies to better understand the impacts of coastal acidification.

   EPA does not publish numeric 304(a) national recommendations for biological criteria, but rather provides technical assistance and guidance for states to develop their own based on state- or site-specific information. To provide technical assistance to states to better understand and measure the effects of coastal acidification at specific locations, EPA has provided biological assessment tools and will continue to develop additional technical support as our scientific understanding improves. In 2016, EPA published *A Practitioner's Guide to the Biological Condition Gradient: A Framework to Describe Incremental Change*

[5] https://www.epa.gov/green-infrastructure
[6] https://www.epa.gov/npdes/npdes-stormwater-program
[7] https://www.epa.gov/green-infrastructure/community-solutions-stormwater-management-guide-voluntary-long-term-planning

in Aquatic Ecosystems.[8] Tools such as the Biological Condition Gradient (BCG) can help states holistically monitor and assess incremental changes in aquatic health due to increases or decreases in overall stressors. States and territories may find biological criteria, and BCGs, helpful to make listing decisions based on their narrative water quality standards for protecting aquatic life, to communicate and document the effects of coastal acidification, and to document improvements when actions are taken to reduce local non-point sources of pollutants into coastal and estuarine waters. Currently, EPA is supporting a pilot project to develop a BCG for coral reef ecosystems in the Caribbean Sea to more precisely define and measure the biological condition of coral reefs along a gradient of increasing stress. In concert, EPA is working to develop an approach to quantitatively link the coral reef BCG with the dominant stressors impacting coral reefs, including land-based sources of pollution that contribute to coastal acidification.

6. Continuing to conduct research to better understand the effects of coastal acidification and identify the biological response endpoints that are most sensitive, the relative contributions of causative pollutants, and the cost of the impacts.

   In order to identify biological response endpoints that are most sensitive to coastal acidification, EPA has ongoing collaborative efforts with the State University of New York at Stony Brook, University of Rhode Island, and Rhode Island College in Narragansett Bay. These efforts include laboratory studies to predict ecological effects of acidification on shellfish populations, incubation studies of estuarine phytoplankton response to CO_2 enrichment, mesocosm studies to quantify the role of estuarine macrophytes in moderating acidification, and field studies of nutrients and carbonate chemistry. Additionally, EPA has current projects to explore the effects of pH in combination with other stressors on laboratory-held corals. These studies examine the effects of acidification and other stressors on growth and calcification, as well as larval settlement. Also, to project relative vulnerability of near-shore coastal species to climate change at regional scales, a trait-based risk framework is being developed. These biotic and climatic data are synthesized via the Coastal Biodiversity Risk Analysis Tool (CBRAT).[9] A preliminary estimate of the risk to 388 species of crabs from the Gulf of California to the Beaufort Sea is underway.

   In terms of modeling efforts, EPA is developing bio-economic models for valuing marine ecosystem services and assessing economic impacts from acidification, with initial efforts focusing on impacts in the Gulf of Maine and the Salish Sea. These models have several components: climate models to estimate future ocean conditions with respect to temperature and acidification, population models to predict how changes to the ocean will affect productivity of shellfish farms and wild harvests of shellfish, and economic models to predict changes to market prices, shellfish sales, and estimates of wages and jobs supported by the shellfish industry. EPA is also collaborating with the Washington State Department of Ecology and the Pacific Northwest National Laboratory, as well as continuing with ongoing efforts in the northern Gulf of Mexico, Tillamook Estuary and southern New England on

[8] U.S. EPA. 2016. A *Practitioner's Guide to the Biological Condition Gradient: A Framework to Describe Incremental Change in Aquatic Ecosystems.* EPA-842-R-16-001. U.S. Environmental Protection Agency, Washington, DC.
[9] http://www.cbrat.org/

modeling efforts that will provide estimates of the relative contributions of land-based sources of pollution to coastal acidification in each of these areas and will help determine sensitive coastal systems and future impacts.

7. Partnering with other programs to coordinate efforts on ocean acidification.

The Federal Ocean Acidification Research and Monitoring Act of 2009 directed the Joint Subcommittee on Science and Technology to create the Interagency Working Group on Ocean Acidification (IWG-OA) to coordinate ocean acidification activities across Federal agencies. The IWG-OA, in which EPA participates, is responsible for organizing and expanding research programs with the following goals related to ocean acidification: to enhance understanding of the effect on marine ecosystems, identify marine ecosystem conservation measures, facilitate information exchange, and investigate the socioeconomic impacts. In 2014, the IWG-OA published the *Strategic Plan for Federal Research and Monitoring of Ocean Acidification*.[10] Research goals identified by the IWG-OA include: improve existing systems that monitor chemical and biological effects of ocean acidification; laboratory and field research to examine the physiological, behavioral and evolutionary adaptive capacities of selected species; develop comprehensive models to predict changes in the ocean carbon cycle and effects on marine ecosystems and organisms; develop vulnerability assessments for various CO_2 emissions scenarios; and assess the cultural, subsistence, and economic effects of ocean acidification. Additionally, the IWG-OA releases biennial reports to Congress, which summarize federally-funded ocean acidification research and monitoring activities and provide expenditures for these activities.[11]

EPA also co-chairs the Interagency Working Group on Harmful Algal Blooms and Hypoxia Research and Control Act (HABHRCA), which is implementing recommendations that were outlined in a national strategy published by the National Science and Technology Council in February 2016, *Harmful Algal Blooms and Hypoxia Comprehensive Research Plan and Action Strategy: An Interagency Report*.[12] EPA will continue ongoing efforts and discussions with federal, state, and tribal partners with the aim of developing a better understanding of the link between harmful algal blooms, hypoxia, and ocean acidification, as well as the causes, research needs, priorities, and effective actions necessary to mitigate impacts on aquatic life. Lastly, EPA has an Agency-wide Ocean and Coastal Acidification Coordination Workgroup that was formed to foster coordination across the Agency to ensure efforts are leveraged, whenever possible, across regions and offices.

[10] http://oceanacidification.noaa.gov/IWGOA/ResearchStrategy.aspx
[11] http://oceanacidification.noaa.gov/IWGOA/Documents.aspx
[12] https://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/habs_hypoxia_research_plan_and_action_-_final.pdf

In summary, EPA has many ongoing efforts under the CWA to better understand coastal acidification and to identify effective actions to mitigate its impacts on aquatic life, and the results of these efforts will be made available to the public. EPA also plans to continue our coordination and discussions on this topic with other federal and state partners. Thank you for your continued interest in addressing ocean acidification.

Sincerely,

Joel Beauvais

Deputy Assistant Administrator